Welch Allyn®
Kreativ®

Mach 4.0 and Mach 4.1 Air Abrasion Instruments

Instructions for Use

Please read this manual thoroughly prior to first use

CAUTION: This device must only be purchased by, or sold to, a licensed dentist.

Copyright Notice:
Copyright © 1999, Kreativ, Inc. All rights reserved. No part of this manual may be reproduced without written permission from Kreativ, Inc.

Manufactured by

Kreativ, Inc. (USA)
9025 Balboa Avenue
San Diego, CA 92123

European Regulatory Manager

Welch Allyn LTD.
Navan, Co. Meath
Republic of Ireland
Ph: 353-46-79060

990242 Rev. A

Chapter	Description	Page #
1	**Introduction and General Information**	
	Introduction	1
	Purpose of this Manual	1
	General Information and Features	2
	Specifications	2
2	**Safety**	
	Warnings and Cautions	3
3	**Controls and Connectors**	
	Names and Functions	5
	Drawings of Controls	8
	Functional Description	9
4	**Unpacking and Setup**	
	General Information	10
	List of Contents	11
	Unpacking and Setup	12
	Supply Requirements	12
	Electrical Requirements	12
5	**Installation and Unit Checkout**	
	Pre-Installation Requirements	13
	Unit Checkout	13
	Filling the Mixture Chamber	15
	Operational Checkout	15
	Drawing of the Mixing Chamber	16
	Footswitch Operation	16
	Unit Shutdown	17
	Unloading the Powder Chamber	17
6	**Sterilization**	
	Sterilization Procedures	18
7	**Operating Instructions**	
	Intra-Oral Applications	19
	Extra-Oral Applications	20
	General Operating Procedures	21
	Step-by-Step Operating Instructions	23
8	**Troubleshooting and Maintenance**	25
9	**Handpieces and Abrasives**	
	Handpieces	29
	Abrasives	29
10	**Warranty, Returns, and Adjustments**	
	Returns and Adjustments	30
	Limited Warranty	30
	Storage and Shipment	31

1

Introduction and General Information

Introduction

The Kreativ Models *Mach 4.0* and *4.1* Advanced Particle Beam Systems (APB) are a compact, highly reliable instrument designed for performing Air Abrasive MicroDentistry procedures. It is designed as a means of removing tooth structure and other materials in preparing teeth for restoration, and as an adjunct to the high speed dental handpiece and bur. This instrument was designed after extensive consultation with dentists in order to provide the optimum performance, taking into consideration patient comfort and the time constraints faced by today's 21st century dental office.

This manual should be thoroughly studied before installing and using the equipment. Please call your nearest Welch Allyn / Kreativ service representative if you need additional information regarding installation, operation or service of the unit.

Purpose of this Manual

Information essential to the installation, operation, and routine maintenance of the *Mach 4.0* and *4.1* APB devices, manufactured by Kreativ, Inc., are included in this manual. The instructions are written specifically for personnel who have been trained in restorative and preventive dentistry.

General Information and Features

The Kreativ Models *Mach 4.0* and *4.1*, APB are designed to provide a controlled flow of an abrasive powder and air mixture through a very precise nozzle. Applications include cutting, abrading, deburring, peening, and etching of tooth structures and other materials.

A full selection of abrasive powders and nozzle sizes are available from your nearest Welch Allyn / Kreativ distributor. See the listing of supplies in Section 9.

All user serviced components, such as control valves and hose connections allow for easy access through the front and rear panels of the instrument. A footswitch is provided to activate the handpiece. The instrument features a mixing chamber which can be quickly unloaded in order to facilitate service, changing abrasive powders or cleanup of the unit after use.

Specifications

- Power Requirements: 110-220 volt, AC, 60 Hz.
  220-240 volt, AC, 50 Hz.
- Air Requirements : 80 PSI to 120 PSI (maximum)
  (550 to 825 kPa)
  (filtered dry air source)
- Approximate Size: 13"W x 11"D x 11"H
  (33 cm W x 28 cm D x 28 cm H)
- Approximate Weight: 43 lb. (20 kg)
- Environment Limitations: Temperature: 50 °F to 104 °F (+10 °C to 40 °C)
  Humidity: 30% to 75%

2

Safety

Warnings and Cautions

Always wear protective eye equipment in order to avoid corneal abrasion or irritation if particles are deflected into the eye. This applies to all personnel including the patient.

Use a rubber dam for all operative procedures in order to avoid injury to gingiva or other soft tissue. A rubber dam or latex matrix band is also required for interproximal preparations to protect adjacent tooth surfaces.

In order to reduce the risk of embolism ***never direct the handpiece toward an open pulp chamber or at pulpal exposures***. Also ***never place the handpiece in direct contact with the gingiva when the air is activated***. While the abrasive stream will not cut the gingival tissue, it may irritate it.

The handpiece should be directed precisely at surfaces and tooth structures which are to be modified or removed. The nozzle tip should be placed two (2) millimeters from the tooth and angled toward the area to be removed or modified. Unlike the high speed handpiece, the *Mach 4.0* and *4.1* handpiece nozzles cut only directly from the end, there is no side cutting.

Always use your high volume evacuation system when using the handpiece on the Kreativ Models *Mach 4.0* and *4.1*. Have the dental assistant place the high volume evacuation system in close proximity to the operative site.

Do not attempt to service the unit beyond those described items in the maintenance section. ***Call your nearest Welch Allyn / Kreativ service representative for advice.***

The Kreativ Models *Mach 4.0* and *4.1* APB systems are designed for use only by and on the order of a dentist.

Make sure that the air hose and footswitch are connected to the Kreativ Models *Mach 4.0* and *4.1* and that the instruments are connected to a properly grounded electrical outlet.

Do not substitute non-Kreativ, Inc. materials. Use of materials supplied by other manufacturers may result in damage to the unit and will void the factory warranty.

Use only clean dry air. Make sure that your air compressor system is equipped with air dryer filter systems and that they are fully operational. Any moisture or oil in the air supply will adversely affect your *Mach 4.0* or *4.1* instrument.

Check to be sure that your air system produces a minimum of 80 psig (550 kPa) at 0.7 cfm (19.8 l/m).

Sound clinical judgment, good common sense, and proper training are essential to the successful use of the unit in order to provide safe and efficient patient care.

Always follow standard of care protocols in performing dental operative procedures. Air Abrasive MicroDentistry technology does not replace current accepted standard of care, rather it is a new technology designed to help accomplish them.

3

Controls and Connectors

The diagram on page 8 illustrates the external controls, indicators, and connectors for the Kreativ Models *Mach 4.0* and *4.1* units. The following describes their functions.

Names and Functions

#1. Unit POWER Switch;

In the ON position, this switch activates the main power to the unit.

#2 Green POWER Indicator LED

This LED illuminates when the unit POWER switch is in the ON position indicating that electrical power is ON..

#3 Beam Intensity Control: (Continuously variable from 1-10 (approximately 0 to 7 grams/min.)

This knob adjusts the desired rate of powder flow. To operate, begin with minimum abrasive powder flow and increase until the desired cutting effect is achieved.

#4 Air Pressure Gauge:

Indicates amount of air pressure supplied to the Mixing Chamber and ultimately to the handpiece. For normal operations, 50-80 psig (345 to 550 kPa) is used. For certain operations a lower or higher pressure may be desirable.

#5 Particle Energy Control:

Adjusts output air pressure which is indicated on the Air Pressure Gauge.

#6 Status Indicator LED:

Indicates the status of main (top) pinch valve. When the light is GREEN, the pinch valve is OK. When the pinch valve tubing ruptures and requires replacing, the Status indicator will flash red and an audible alarm will sound when the footswitch is depressed.

#7 Continuous/Pulse Switch, Mode Indicator LED:

Select either continuous mode or pulse mode. In continuous mode the indicator LED is AMBER. In pulse mode the indicator LED is GREEN.

#8 Air ON/OFF switch, Air Status LED:

This switch enables the main air solenoid. When in the OFF (amber) position, the air flow through the system is disabled. In the ON (green) position the system is pressurized.

#9 Powder Chamber Unload Switch:

This switch enables the vibrator assembly when depressed. When used with the powder chamber in the unload position causes the abrasive to flow smoothly and easily from the chamber.

#10 Handpiece:

The handpiece holds the nozzle through which the abrasive powder/air flows.

#11 Power Supply Cord:

This power supply cord connects electrical power to the unit. This power requires a properly grounded outlet.

#12 Footswitch:

The Footswitch is an electric switch. When the foot pedal is depressed the main solenoid is enabled delivering air/abrasive to the nozzle. The orange protective housing will prevent accidental activation of the system.

#13 Input Air Supply Hose:

This hose connects the external air supply to the unit. A 1/4-18 NPT fitting is provided on the end of the hose. The air supply should be from a clean, dry air source.

#14 Rear Cover Interlock Switch:

Disables the air supply when the back cover is opened.

#15 Main Abrasive Pinch Valve (top)

The top pinch valve opens and closes with depression of the footswitch. It controls the flow of air/abrasive to the handpiece/nozzle. The Status Indicator LED monitors this pinch valve and will flash red with a audible alarm when the pinch valve tubing is ruptured and needs replacing.

#16 Quick Dump Pinch Valve (middle)

This pinch valve relieves the pressure and abrasive in the hose and handpiece when the Footswitch is released. When the footswitch is released the Quick Dump Pinch Valve opens allowing the built up pressure and abrasive in the hose and handpiece to be expelled into the Exhaust Bottle.

#17 Bleed Off Pinch Valve (bottom)

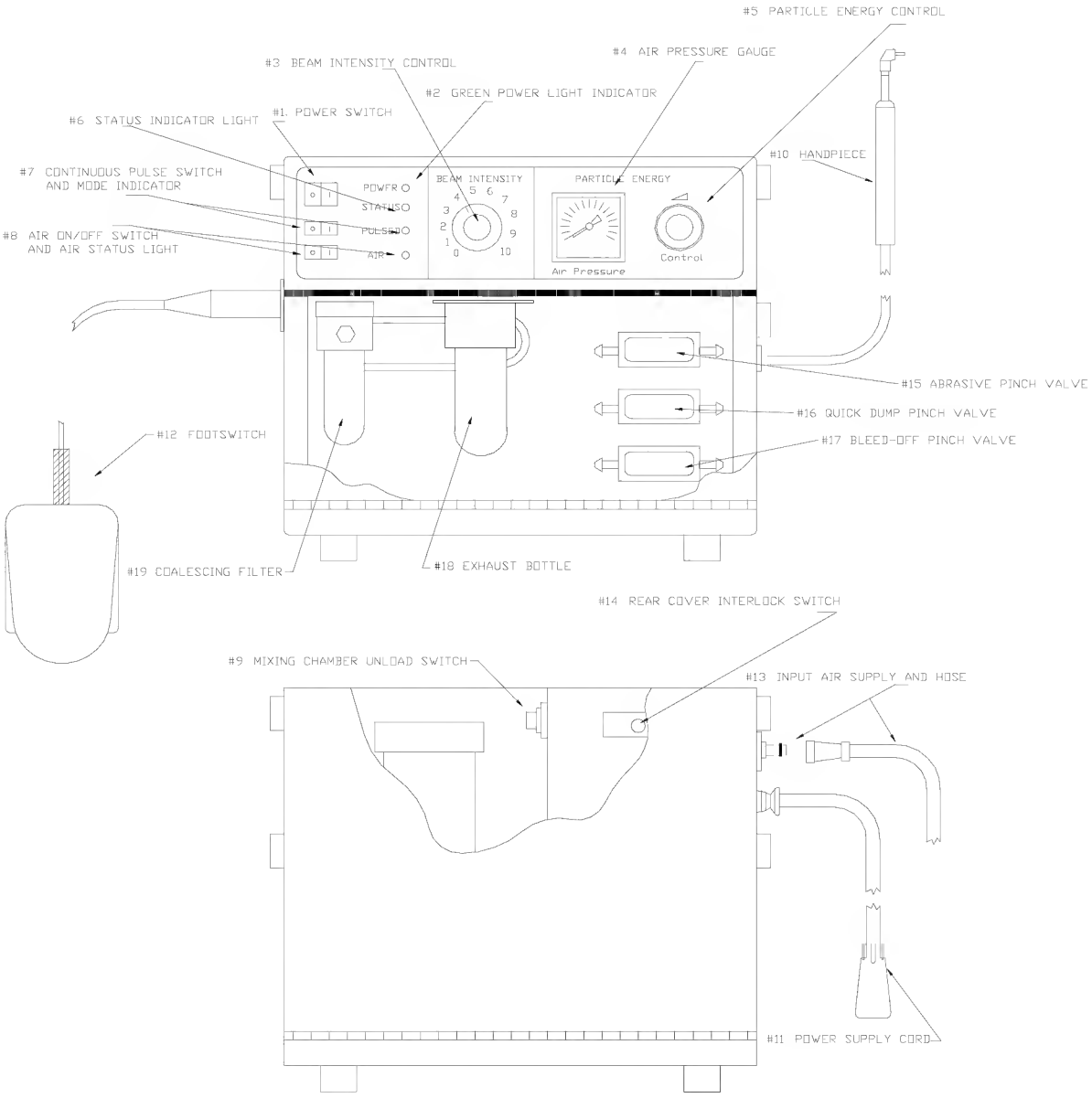
This pinch valve is used to depressurize the system when: a) the unit is turned off b) the Air Switch is in the Off position or c) the Rear Door Interlock is open. In any of the 3 previous situations the bottom pinch valve will open allowing any pressure in the unit to be released through the Exhaust Bottle.

#18 Exhaust Bottle

The Exhaust Bottle is used as a relief port for air pressure and abrasive when the footswitch is released or the unit is turned off or depressurized.. The air and/or abrasive is received via the middle and/or bottom pinch valve. Any abrasive is filtered and the air is release via a port on the side of the Exhaust Bottle. Since the Exhaust filters and collects abrasive, it must be periodically be emptied.

#19 Coalescing Filter

The Coalescing Filter is in the incoming air supply line. It will remove **small** amounts of oil or moisture that might be in the air supply. It automatically dumps any oil or moisture collected each time the unit is turned off. If oil or moisture is noticed below the coalescing filter, the air supply should be checked for the source.


#5 PARTICLE ENERGY CONTROL
#4 AIR PRESSURE GAUGE
#3 BEAM INTENSITY CONTROL
#2 GREEN POWER LIGHT INDICATOR
#6 STATUS INDICATOR LIGHT
#1 POWER SWITCH
#10 HANDPIECE
#7 CONTINUOUS PULSE SWITCH AND MODE INDICATOR
#8 AIR ON/OFF SWITCH AND AIR STATUS LIGHT
POWER
STATUS
PULSED
AIR
BEAM INTENSITY
PARTICLE ENERGY
Air Pressure
Control
#15 ABRASIVE PINCH VALVE
#16 QUICK DUMP PINCH VALVE
#17 BLEED-OFF PINCH VALVE
#12 FOOTSWITCH
#19 COALESCING FILTER
#18 EXHAUST BOTTLE
#14 REAR COVER INTERLOCK SWITCH
#9 MIXING CHAMBER UNLOAD SWITCH
#13 INPUT AIR SUPPLY AND HOSE
#11 POWER SUPPLY CORD

Functional Description

The power Indicator LED is illuminated when the unit is ON and ready for use. This indicates that AC input power is connected to the unit.

Kreativ Models *Mach 4.0* and *4.1* provide a controlled mixture of abrasive powder particles in a dry air stream and delivers this mixture through a nozzle.

The input air supply is routed throughout the system after passing through the main air solenoid and coalescing filter. One path is through the main regulator (used to set the desired operating pressure on the control panel) to the mixing chamber where the abrasive particles are picked up. From there the air carries the particles through the main pinch valve and on to the handpiece/nozzle when the footswitch is depressed. The second path is through the pinch valve regulator and pinch valve control system.

The Beam Intensity control regulates the amount of abrasive particles fed into the main air stream through the mixing chamber.

The air stream combined with abrasive powder is able to cut and etch tooth structure and ceramic. The abrasive powder/air stream is directed through a light, flexible hose to the handpiece for precise cutting. Various handpieces are offered with specific orifice (nozzle) sizes to enable the practitioner to accomplish particular tasks. In addition, a selection of abrasive powder is available to accommodate all desired uses. Nozzle and abrasive powder types are listed in Section 9.

When the Power switch is set to **OFF** the unit automatically bleeds off the internal air pressure.

Caution

Do not attempt to open the covers of the unit with power turned on!

4

Unpacking and Setup

General Information

SAVE THE CARTON AFTER UNPACKING THE SYSTEM!

The *Mach 4.0* or *4.1* and all accessories are shipped in a single container. When unpacking, check items against the list of contents packed with the unit. ***The shipping container and packing materials should be retained in the unlikely event that the unit has to be returned to the factory for service or repair.***

The table on page 11 lists the standard equipment supplied with the unit.

Operation of the *Mach 4.0* or *4.1* requires an external source of either clean, dry, compressed air or nitrogen together with a properly adjusted pressure regulator. In most cases your standard dental compressor and high volume evacuation system are adequate for this purpose. For additional information consult your nearest authorized Welch Allyn / Kreativ service representative.

List of Contents

Part Number	Item	Quantity
	Standard Equipment	
K01-00090-001	**Kreativ *Model Mach 4.0* or *4.1* APB with Footswitch**	**1**
Includes:		
130041	Domestic Starter Kit	1
130045	Instructional Video	1
140008	Powder, 27.5 micron (Aluminum Oxide) 4 lbs. ea.	1
170010-2	Green Nozzle, 0.014" (0.36mm) 67°	1
170010-3	Green Nozzle, 0.014" (0.36mm), 90°	1
170011-2	Blue Nozzle, 0.018" (0.46mm), 67°	1
170011-3	Blue Nozzle, 0.018" (0.46mm), 90°	1
170053	Red SST Handpiece/Nozzle Assembly, 45°	1
170081	Footswitch Assembly	1
200002	Standard Handpiece Assembly	2
600105	Domestic Hospital Grade Power Cord	1
990242	Instruction Manual	1
K01-00058-1	Air Supply hose 10' with Quick Disconnect	1
K01-00325-1	Pinch Tube Kit	1
K99-00002-1	Protective Eyewear	3 pr.
K99-00015-1	Fuse, 1A 250V Slo Blo 5 x 20 mm	2
K99-00243-1	Brass Fitting 10-32 x 1/8 for Pneumatic Hose	1

Unpacking and Setup

Open and remove the *Mach 4.0* or *4.1* unit from the shipping container and proceed as follows:

- Open the front and rear covers by releasing the latches.
- Remove the foam packing (3 pieces) used to prevent the vibrator from moving during shipping. *Retain the foam with the shipping box and packing materials.* If the unit is to be shipped again, the vibrator support foam packing should be reinstalled to *prevent possible damage* to the vibrator and its mounts.

WARNING

Failure to remove the foam packing will result in improper vibrator operation and powder flow.

Supply Requirements

Air Supply: A filtered compressed air line or nitrogen may be used as the gas supply for the unit.

CAUTION!

The use of compressed oxygen as a gas supply presents a fire hazard.

Under *NO* circumstances should oxygen be used.

For optimal use the normal air supply to the unit should be a minimum of 80 psig (550 kPa) with a maximum of 120 psig (825 kPa), the air source should provide a minimum of 1.5 CFM (42.5 l/m). Since many dental office compressed air lines may be contaminated with moisture, oil and dirt which are detrimental to the performance and operation of the unit, moisture filters and unloaders must be used. Moisture filters for this purpose can be purchased directly from your Welch Allyn / Kreativ sales representative.

Electrical Requirements

The electrical requirement for this unit is 100-127 VAC, 60 Hz., single phase or 220-240 VAC, 50 Hz. If your requirements are different, consult your nearest authorized Welch Allyn / Kreativ service representative before operating this unit.

5

Installation and Unit Checkout

After completing the operations in Section 4 you are now ready to begin installation of your Kreativ *Mach 4.0* or *4.1.*

Pre-Installation Requirements

1. Adequate Air Supply. Ensure that you have at least 80 PSI (550 kPa) @ 1.5 CFM (42.5 l/m) of clean, dry air. (The ideal air for the *Mach 4.0* or *4.1* is obtained by placing a "T" fitting prior to the final regulator at the operatory but after the dryer, traps and various filters.)

2. Power supply with earth grounding.

   NOTE: Route the power cord safely out of the way and *do not use* an extension cord.

Unit Checkout

- Set the Power Switch on the front panel to OFF, and the POWDER FLOW knob completely counter clockwise to the zero (0) position.

- Connect the end of the air supply hose with the quick disconnect to the external air supply.

- Plug the power supply cord into a properly grounded receptacle.

- Set the Power Switch to ON. The green pilot light should be illuminated.

WARNING!

If the green pilot light does not go on, it indicates absence of electrical power. If, after verifiying that power is available, the indicator light *STILL* does not go on, consult your local Welch Allyn / Kreativ service representative.

- Check the reading on the AIR PRESSURE gauge. Set Particle Energy Control as follows:

    1. Pull the black knob out and rotate knob to a reading of 80 PSI (550 kPa) on the pressure gauge.

    2. To prevent any changes push the black knob in/forward to lock it at that setting.

- Verify that a Handpiece/Nozzle is attached to the delivery hose.

- Actuate the Footswitch. Air should flow from the nozzle.

CAUTION!

Some residual powder may be in the unit from factory testing. *Always* use goggles or protective eyewear when using the Kreativ Model *Mach 4.0* or *4.1* Air Abrasion instrument and do not direct the nozzle toward the face when operating the footswitch.

- Set the Power Switch to OFF. This allows the system to depressurize.

CAUTION!

After turning the Power Switch to the OFF position, monitor the Air Pressure Gauge to be sure that the air pressure drops to 0. An additional 5 to 10 seconds of depressurizing time must be allowed after the gauge reading reaches zero (0) before removing the Mixing Chamber Top, or performing other services.

- Fill the Powder Chamber as described on the next page.

Filling the Mixing Chamber

Observe the following procedures when filling the Mixing Chamber.

- Place the Power Switch of the unit to OFF. This allows the system to depressurize.
- After turning the Power Switch to the OFF position, monitor the Air Pressure Gauge to be sure that the air pressure drops to 0. Allow an additional 5 to 10 seconds after the gauge reaches 0 before opening the Powder Chamber.
- Clean off any dust or debris from the Mixing Chamber top and cover.
- Remove the Mixing Chamber lid by turning counterclockwise.
- Carefully pour abrasive powder into the Mixing Chamber until it is 3/4 full.
- Replace the Chamber lid and tighten.

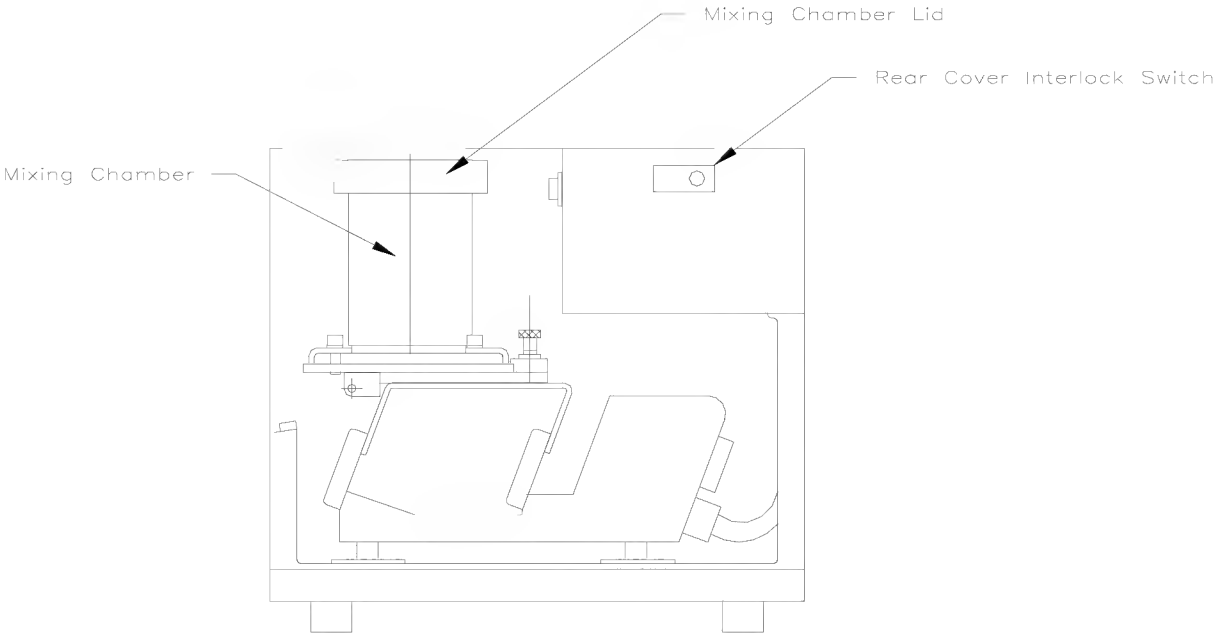
CAUTION!

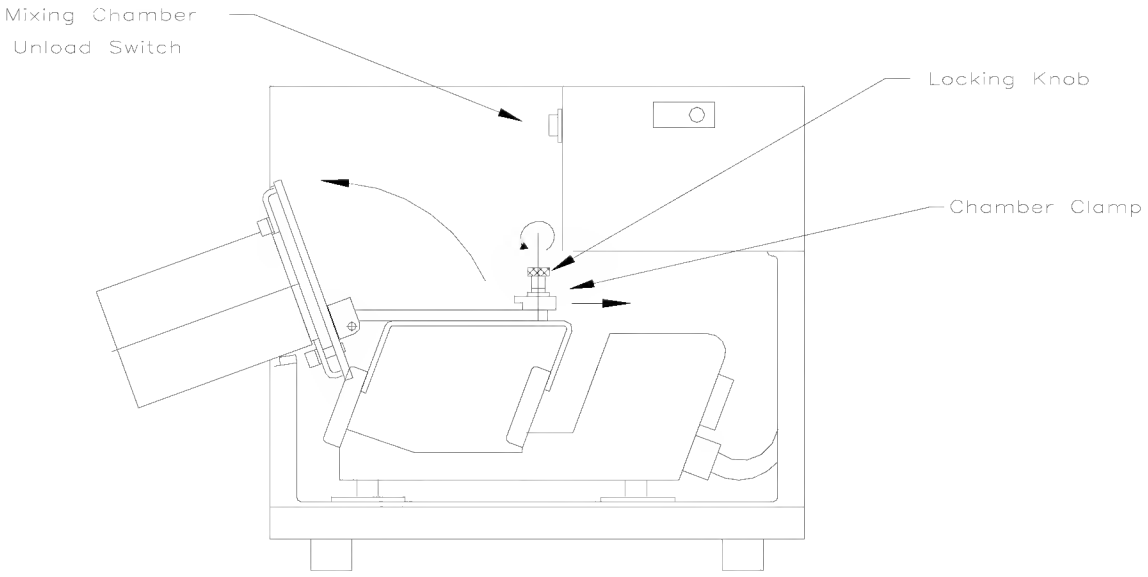
Make certain that no lint, dirt or other foreign substances enter the chamber. This can result in plugging the unit.

Operational Checkout

- Place the Power Switch to ON and set the Beam Intensity knob to obtain the desired amount of powder flow for the operation to be performed. Powder flow is at a minimum counterclockwise "zero" position and gradually increases to the clockwise or "ten" position. Typical dental procedures use powder flow from 3-5 on the dial.
- Place the Air Switch to the ON position.
- Actuate the Footswitch to obtain powder flow through the nozzle.

You can now practice operative procedures on extracted teeth as described in Section 2, Safety.


Mixing Chamber Lid
Rear Cover Interlock Switch
Mixing Chamber


Mixing Chamber
Unload Switch
Locking Knob
Chamber Clamp

Footswitch Operation

- Footswitch operation: depressing the footswitch starts the powder flow through the handpiece/nozzle.

Unit Shutdown

- Set the Power Switch to OFF.

Unloading Powder Chamber

The illustrations on page 16 show the parts involved in unloading the Mixing Chamber. Follow these directions when unloading it.

- Open the back access panel.
- Firmly hold the chamber and vibrator and loosen the Mixing Chamber Lid by turning it counterclockwise.
- Completely unscrew the lid from the Mixing Chamber.
- Loosen the locking knob on the Chamber Tilt Plate; slide the Chamber Clamp back to release and tilt the chamber out of the cabinet.

NOTE: A container must be placed under the chamber opening to catch the abrasive powder.

- Set the Beam Intensity on the front panel to "10".
- Press the Mixing Chamber Unloading Switch to vibrate the abrasive powder out of the Mixing Chamber.
- Tilt the Mixing Chamber back to its upright position.
- Slide the Chamber Clamp forward over the Chamber Tilt Plate and tighten the knob.
- Replace the lid and nut making sure the threads are free of powder and the lid gasket is properly seated.
- Check the two air hoses attached to the Mixing Chamber to assure that they are not kinked or pinched and that they make a large free loop.

6

Sterilization

WARNING!

All Kreativ Model Mach 4.0 and 4.1 accessories which come into contact with the patient *must be sterilized* prior to each use.

Sterilization Procedures:

Handpiece/Nozzle:

Any conventional dental (dry heat, steam or chemical) sterilizer or autoclave may be used to decontaminate the cutting handpiece/nozzle. *This is mandatory prior to each use.* This procedure ensures that the handpiece/nozzle cannot become a source for cross contamination of disease or infection.

Accessories:

The handpiece/nozzle hose assembly of the Kreativ Models *Mach 4.0* and *4.1,* which will be in close proximity to the patient or other sources of contamination, should be sheathed or wiped down in accordance with standard procedures.

7

Operating Instructions

SPECIAL NOTE: **As previously stated. you should practice on extracted teeth in order to appreciate the unique cutting ability of the Kreativ *Mach 4.0* or *4.1* systems.**

Intra-Oral Applications:

- Cavity preparation for dental restorations.
- Removal of composite restorations.
- Partial removal of composite restorations and repair at failure sites.
- Preparation for pit and fissure sealants.
- Prophylaxis.
- Removal of stains from teeth and removal of calculus/tartar from teeth.
- Prepare teeth for veneer/facing restorations.
- Etch metal/porcelain/composite restorations prior to repairing them.
- Prepare teeth for cavity preparations, Class I, II, III, IV & V restorations.
- Polish metallic restoration margins.
- Remove old amalgam/porcelain restorations.
- Remove residual stains from enamel & dentin.

Extra-Oral Applications

- Clean cement from a displaced crown prior to recementations.
- Satinize metallic restoration to locate interference prior to cementation.
- Etch internal surfaces of restorations.
- Carve occlusal anatomy in porcelain restorations prior to bonding cementation.
- Etching stainless steel crown.
- Satinize restorations to check for seating interference.
- Clean restorations prior to recementation.

CAUTION!

DO NOT USE the Kreativ Model *Mach 4.0* or *4.1* for procedures not included or suggested in this instruction guide.

The Kreativ Model *Mach 4.0* and *4.1* systems should be used *only* by dental professionals who have practiced on extracted teeth and who are thoroughly familiar with this manual.

⇒ The use of the Kreativ Model *Mach 4.0* and *4.1* systems as described can generally be well tolerated by patients without local anesthesia. If a patient reports discomfort, an anesthetic may be called for.

⇒ In general, cutting speed increases with:

- increased air pressure,
- increased powder flow,
- and decreased distance to the tooth structure.

⇒ Cutting speed decreases with:

- decreased air pressure
- decreased powder flow
- and increased distance to the tooth.

⇒ Enamel cuts slower than dentin thus:

- It may take *1-2 minutes* to complete a class I preparation on a molar
- But it may take *only 5 seconds* to complete a class V preparation on a premolar.

⇒ Increased powder flow and air pressure will increase cutting speed, but it will also deliver more powder which must be controlled with the high volume evacuation.

> With experience you will find a comfortable balance between cutting speed and controlling the powder flow in the mouth.

⇒ Most preparation procedures can be easily accomplished with:

- about 60-80 PSI (619-825 kPa)
- the powder flow set at about 3-5.

⇒ Start by using the general settings (above) and the 0.018 (0.46 mm) tip.

⇒ As you gain experience choose the nozzle size and system settings which suit your individual needs.

General Operating Procedures

The Cutting Process:

The unit performs a cutting action by impinging sharp-edged powder particles onto a surface. A cylindrical powder/air stream emerges from the nozzle for a short distance (approximately 1.6 mm) and then diverges into a cone shape, with a seven degree included angle. Within the 1.6 mm, the nozzle makes small holes and straight walled cuts. As one moves the nozzle away from the work, the hole diameter or width of cut increases, and the walls become angular. The angle can be determined with a few trials. To obtain sharp definition (as in precise cutting) use the 0.014″ (0.36mm) diameter nozzle and keep the nozzle tip to a minimum of 0.8 mm from the work.

Cutting Speed:

The cutting speed (removal of material) increases up to a certain nozzle distance.

Vary the cutting rate by:

1) adjusting the powder flow and/or air flow.
2) using different pressure settings .
3) using different powder sizes.
4) using special type nozzles.

Etch or remove broad areas of metallic film or coatings by increasing the nozzle tip distance and diverting the air stream at an acute angle.

Powder Flow Adjustment

Depressing the footswitch causes a mixture of powder and air to be discharged from the nozzle. Control the mixture richness with the Beam Intensity Knob which adjusts the vibrator speed. We suggest starting between the 3 and 5 position.

Pressure Behind the Nozzle

Necessary air pressure varies depending upon:

- the material being cut.
- the type of cut.
- the abrading process desired.
- the powder being used..

We suggest starting at 65 PSI (447 kPa).

Check the Progress of the Cavity Preparation

Stop frequently,(every few seconds) and make a visual inspection of the progress.

As you begin using the Kreativ Model *Mach 4.0* or *4.1* , we suggested that you use short bursts of air/powder mixture.

- DO NOT continue for more than 5 seconds without stopping to make a visual inspection.

- For class V restorations DO NOT continue for more than *2 seconds* without stopping to examine the results.

Use a Saliva Ejector

As with any other cavity preparation procedure, your conventional saliva ejector should be normally positioned in the patient's mouth to collect the saliva and rinse water.

Use Your High Volume Evacuation System

This is important when using the Kreativ Model *Mach 4.0* or *4.1* for cavity preparation or cutting procedures. Place the HVE about ½ to 1 cm from the operative site to collect the abrasive powder.

Stopping to Rinse

Most cavity preparations will take between 30 seconds to 1½ minutes. On longer procedures some patients will experience discomfort from dryness and may wish to have their mouth rinsed with the water syringe and evacuated with the saliva ejector.

WARNING!

Without adequate filtration, use of the Mach *4.0* or 4.1 may accelerate the wear on the metal parts of your vacuum system.

Step-by-Step Operating Instructions

Notes: A) Always pre-load the Mixing Chamber with the abrasive powder appropriate for the procedure to be performed.

B) Make sure that the *air source* is connected to the input *air supply hose*.

C) Make sure the power cord is connected to a properly grounded receptacle.

Proceed as follows:

1. Remove the Handpiece/Nozzle from its sterile package and place it on the Air Supply Hose.
2. Prepare your patient just as you would for traditional procedures.
3. Turn the Kreativ Model *Mach 4.0* or *4.1* unit Power Switch to ON.
   (The green light should be illuminated.)
4. Turn the Air Switch to the ON position.
5. Adjust the air pressure and powder flow to the rates needed for the procedure.
6. With the nozzle pointed into a receptacle such as a sink or your vacuum system, press the footswitch to check that the air-powder mixture is flowing from the nozzle.
7. Direct the tip at the desired target tissue, and with the aspirator in place, begin the procedure. Observe the progress carefully!

8. When the procedure has been completed, turn the Power Switch to OFF. The Main Air Valve will be closed, the input air supply will shut off, the unit will depressurize.

CAUTION!

When changing powders, you must discharge any residual powder remaining in the air lines. To do this, depress the footswitch; it will take several seconds to discharge the previous powder from the system

8

Troubleshooting and Maintenance

PROBLEM	PROBABLE CAUSE	REMEDY
No power	• Instrument not plugged in • Main switch OFF • Blown Fuse • Main switch bad	Check plug Check switch Change fuse Call Service Representative
No powder flow when footswitch is depressed	• Footswitch not plugged in • Powder flow not selected • Handpiece/nozzle clogged • Tubing pinched • Air Valve problem • Mixing Chamber empty	Check connection Check gauge Check for clog Check tubing Call Service. Rep. Refill Mixing Chamber with abrasive powder
Air flow from nozzle when footswitch is not depressed	• Loss of air pressure due to an improperly adjusted Air Valve regulator	Call Service Representative
Erratic powder flow	• Powder caking in Chamber • Chamber empty • Nozzle partially clogged • Vibrator inoperative • Moisture in air line	Replace powder Check powder level Check nozzle Call Service Representative Check filters

PROBLEM	PROBABLE CAUSE	REMEDY
No powder flow	• Clogged orifice in Chamber	Disassemble & clean chamber
Powder spray loses definition	• Worn nozzle tip • Too much distance	Replace nozzle Move closer
Status LED flashes red with audible alarm	• Indicates main (top) pinch valve is ruptured	Replace pinch valve tubing

Periodic Service

The Kreativ Models MACH 4.0 and 4.1 should be inspected periodically for:

- Damaged Mixing Chamber Cover, Cap, Cap Nut and cover seal on Chamber
- Worn or damaged hoses.
- Loose wire or hose connections.
- Burned out indicator lamp.
- Proper Operation of controls and gauges.
- Worn nozzle or handpiece.

The unit should be periodically cleaned, as follows:

- Clean dust and spilled powder from the unit *interior* using low pressure compressed air or vacuum from the dust collector.
- Remove stubborn dirt with a brush.
- **DO NOT USE FLUID** on the hoses or wire insulation.
- Clean the external surfaces of the unit with a cloth moistened with a mild cleaning solution such as Windex or rubbing alcohol.

Handpiece/Nozzle Tips

- The nozzle tips are made of tungsten carbide or sapphire which crack easily, so they must be handled and stored with care.

- Nozzle tips sometimes wear, enlarging the side wall. An air stream with lack of definition signals that the nozzle is worn and the tip should be replaced. To do this unscrew the nozzle from the handpiece and screw in a new one. Make certain that the new nozzle is fastened securely to avoid powder leaks. Avoid cross threading.

- The Red, Violet and Gold SST handpiece/nozzle assemblies do not come apart.

- Replace a handpiece by disconnecting it from the air hose and replacing it with a new one.

On occasion the nozzle of the handpiece will clog due to excessive flow of powder.

Unclog the nozzle as follows:

1) Remove the handpiece from the air hose and turn the Beam Intensity control knob completely counterclockwise.

2) Hold the tip end of the nozzle tight against the air hose connector.

3) Turn the unit on end and actuate the Footswitch, supplying air to reverse flush the clogged tip.

NOTE: This should be done in an exhaust chamber.

Handpiece/nozzles for special applications are available. Consult your Welch Allyn / Kreativ sales representative for information.

Pinch Valve Tube Replacement:

The rubber pinch valve tube wears and will eventually leak.

NOTE: The Pinch Valve body does NOT have to be removed from the unit for tube replacement.

1) Set the Power Switch to the OFF position and monitor the Air Pressure Gauge to be sure that the air pressure drops to 0. Allow an additional 5 to 10 seconds after the gauge reading reaches 0.

2) Remove the front black block from the assembly by removing the two knurled screws.

3) Remove the tube from the fittings and carefully insert the new control valve tube between the fittings.

4) Insert the new pinch tube and fittings into the bottom block indentation.

   NOTE: Be sure to align the pinch valve's seam to the side of the block.

5) Carefully replace the front cover. Again making certain that the tube aligns with the indentations in the top block. Secure the front cover in place with knurled screws, making sure that the thumb screws are tightened down finger tight.

6) Turn the Power Switch to ON and check for proper operation and leaks.

Air ON/OFF Valve

The Air ON/OFF valve controls the flow of air into the unit. The valve is either open, providing air flow, or closed, stopping the flow. The valve is not field repairable. Your nearest Welch Allyn / Kreativ service representative will replace it if it malfunctions.

Air Pressure Gauge. The air pressure gauge is not field repairable and should be replaced with a new one if it malfunctions or fails to operate.

Exhaust Bottle

The Exhaust Bottles in the *Mach 4.0* and *4.1* collect small amounts of powder each time the footswitch is released or the system is turned off. Check the amount of powder collected in the Exhaust Bottle every time you refill the canister with powder. It needs to be emptied when it is approximately half full.

9

Handpieces and Abrasives

Handpieces

These custom nozzles are available for the Kreativ Mach 4.0 and 4.1:

- 0.011" (.28mm) ID at either 45°, 67° or 90°
- 0.014" (.36mm) ID at either 45°, 67° or 90°
- 0.018" (.46mm) ID at either 45°, 67° or 90°
- 0.026" (.66mm) ID at 45° only
- 0.032" (.88mm) ID at 45° only

Supersonic handpiece / nozzle assemblies available for the Mach 4.0 and 4.1:

- 0.11" (0.28mm) ID Violet at 45°, 67° or 90°
- 0.14" (0.36mm) ID Gold at 45°, 67° or 90°
- 0.18" (0.46mm) ID Red at 45°, 67° or 90°

Abrasives

- 27.5 Micron Aluminum Oxide
- 27 Micron Aluminum Oxide
- 34 Micron Aluminum Oxide
- 50 Micron Aluminum Oxide

10

Warranty, Returns and Adjustments

Returns and Adjustments

Warranty claims must be made promptly and received by your nearest authorized Welch Allyn / Kreativ service representative during the warranty period. The liability of Kreativ Inc., under valid warranty claims, is limited to repair or replacement at the purchaser's authorized Welch Allyn / Kreativ Service Center or the purchaser's place of business, at the option of the authorized service representative. If it is necessary to return a product for repair or replacement, authorization for the return must first be obtained from the authorized service representative.

All products returned for examination or warranty repair must be sent insured via a means of transportation specified by your authorized Welch Allyn / Kreativ service representative.

Kreativ, Inc., or its authorized service representative claims the sole responsibility for determining the cause of any instrument failure.

Limited Warranty

Kreativ Inc. warrants the equipment to be free from defects in material and workmanship for a period of 12 months from the date of shipment. Damage due to failure of customer to perform required user/preventive maintenance is not warranteed. Certain components having limited life expectancy (pinch tubes, air/abrasive tubing, handpieces and

handpiece tips) are not warranteed against normal wear and tear or customer damage. This limited warranty applies only to the original purchaser / user of the equipment.

The foregoing limited warranty is exclusive and in lieu of all other warranties, whether written, oral, or implied, and shall be purchaser's sole remedy and Kreativ's sole liability under contract or warranty or otherwise for the product.

Kreativ, Inc., disclaims any implied warranty of merchantability or fitness for particular purposes. In no event shall Kreativ, Inc. be liable for any incidental or consequential damages, or for any incidental or consequential damages arising out of, or in connection with, the use or performance of the product delivered hereunder.

Storage And Shipment

The Kreativ Models *Mach 4.0* and *4.1* have been designed for long term storage in normal dental office environments. If it is to be stored for any reason for a long period, it should be covered to protect it from elements and the Mixing Chamber should be emptied. The area it is to be stored in should meet the Environmental Limitations indicated in the Specifications section of Chapter 1.

The unit has been designed for shipment by normal commercial carriers. Protective packaging should be used, and the original packing materials should be reinstalled for shipment. Shipping instructions must be followed closely. The purchaser will be responsible for damage resulting from improper packing.